

REMARKS

These amendments and remarks are being filed in response to the Office Action dated September 2, 2003. For the following reasons, this application should be allowed and the case passed to issue.

This amendment does not raise any new matter. The amendment to claim 2 is supported by Figs. 2 and 3 and page 7, line 39 to page 8, line 7. Fig. 2 clearly shows that the thickness of the first chip capacitor 6 is less than the thickness of the bumps 5. Support for the amendment to claim 3 is found in Fig. 3 and page 8, lines 1-13, which clearly teach the vias. New claim 16 is supported by the Fig. 2 and page 7, lines 25-29, which clearly teach that the first chip capacitor is disposed among the bumps.

Initially, Applicants respectfully disagree with the Examiner's determination that the elected species does not read on Fig. 3. Claim 2 clearly reads on both Figs. 2 and 3. Fig. 2 represents the embodiment where the chip capacitor is attached to the active regions and Fig. 3 represents the embodiment where the chip capacitor is attached to opposite side of the first semiconductor chip. Claim 2 describes either embodiment.

Claim Rejections Under 35 U.S.C. § 112

Claim 3 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite because "said opposite side" allegedly lacks antecedent basis, the Examiner cannot ascertain what "through-type via contacts" refers to. This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

There is antecedent basis for "said opposite side" in lines 5 and 9 of claim 3. In addition, claim 3 has been amended to specify that the vias extend from the active regions to

the opposite side of the first semiconductor chip. Applicants submit that claim 3 fully comports with the requirements of 35 U.S.C. § 112.

Claim Rejections Under 35 U.S.C. § 102

Claims 2 and 3 are rejected under 35 U.S.C. § 102(e), as being anticipated by Wenzel et al. (U.S. Patent No. 6,150,724). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison of the invention as claimed and the cited prior art.

An aspect of the claimed invention, per claim 2, is a semiconductor device comprising a BGA substrate having one principal plane furnished with a large number of solder balls and a first semiconductor chip having a first side and an opposite side. The first semiconductor chip includes bumps and active regions formed on the first side. The first semiconductor chip is attached to another principal plane of the BGA substrate through the bumps. A first chip capacitor is attached to the active regions of the first semiconductor chip. The thickness of the first chip capacitor is less than a thickness of the bumps.

Another aspect of the claimed invention, per claim 3, is a semiconductor device comprising a BGA substrate having one principal plane furnished with a large number of solder balls. The first semiconductor chip has a first side and an opposite side. The first semiconductor chip includes bumps and active regions formed on the first side. The first semiconductor chip is attached to another principal plane of the BGA substrate through the bumps. A first chip capacitor is attached to the opposite side of said first semiconductor chip. The first semiconductor chip further includes vias extending from the active regions to

the opposite side of the first semiconductor chip. The first chip capacitor is electrically connected to the active regions through the vias.

The Examiner asserts that Fig. 7 of Wenzel discloses a semiconductor device comprising a BGA substrate 106 with a large number of solder balls 112, a first semiconductor chip 102, bumps 110, and active regions, a first chip capacitor 104 serving to reduce power source noise, and through-type via contacts 108.

Wenzel does not anticipate the instant invention because Wenzel does not teach that the thickness of the daughter chip 104 is less than the thickness of the bumps 110. As clearly illustrated in Figs. 5, 7, and 17, the thickness of the daughter chip 104 is much greater than the thickness of the bumps 110. The thickness of Wenzel's daughter chip is so great that a recess is required in the substrate in order to accommodate the daughter chip. On the other hand, in the device of the instant invention, the thickness of the chip capacitor is less than the thickness of the bumps. Therefore, the chip capacitor fits in the space between the first semiconductor chip and the substrate. No modification of the substrate, such as forming a recess, is required to fit the chip capacitor.

Wenzel also does not disclose the first semiconductor chip further including vias extending from the active regions to the opposite side of the first semiconductor chip, and the first chip capacitor electrically connected to the active regions through the vias, as required by claim 3. Wenzel teaches the daughter chip is electrically connected to the same side of the first semiconductor as the active regions. Wenzel does not teach the vias, as required by claim 3.

The factual determination of lack of novelty under 35 USC § 102 requires the disclosure in a single reference of each element of a claimed invention. *Helifix Ltd. v. Blok-*

Lok Ltd., 208 F.3d 1339, 54 USPQ2d 1299 (Fed. Cir. 2000); *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994); *Hoover Group, Inc. v. Custom Metalcraft, Inc.*, 66 F.3d 399, 36 USPQ2d 1101 (Fed. Cir. 1995); *Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992); *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051 (Fed. Cir. 1987). Because Wenzel does not disclose that the thickness of a first chip capacitor is less than the thickness of the bumps, as required by claim 2, nor the vias extending from the active region to the opposite side of the first semiconductor chip, as required by claim 3, Wenzel does not anticipate claims 2 and 3.

Applicants further submit that Wenzel does not suggest the semiconductor devices of claims 2 and 3.

Dependent claim 16 further distinguishes the claimed device. Claim 16 requires that the first chip capacitor is disposed among the bumps. Wenzel does not suggest the claimed semiconductor device with this additional limitation.

In light of the Amendments and Remarks above, this application should be allowed and the case should be passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT, WILL & EMERY



Bernard P. Codd
Registration No. 46,429

600 13th Street, N.W.
Washington, DC 20005-3096
(202) 756-8000 BPC/GZR:kap
Facsimile: (202) 756-8087
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